

MONTANA WATER PLAN

FINAL

December 1990

Section: Drought Management

Introduction	2
Background	2
Policy Statement	2
Issues, Options, and Recommendations	2
Drought Monitoring and Early Warning	2
Impact Assessment	3
Coordination of Governmental Actions	3
Triggering Mechanisms	4
Assistance Programs	5
Funding for Drought Management	5
Programs	5
Research and Educational Programs	5
Drought Mitigation Strategies	5
Plan Implementation	6
Legislative Action	6
Administrative Action	7
Financial Requirements and Funding Strategies	7
Bibliography	8

WATER RESOURCES DIVISION • DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

1520 EAST SIXTH AVENUE • HELENA, MONTANA 59620 - 2301 • (406) 444-6637

INTRODUCTION

Montana's water supplies vary from year to year. Some years there is too much water and flooding occurs. In other years, there is too little water and drought results. Drought is an inevitable part of Montana's climate. It will happen again as it has happened in the past.

Most Montanans understand that drought is inevitable. This does not mean that they can do nothing to reduce drought effects. Although the state may not be able to make it rain or snow, it can help its citizens prepare for and minimize the effects of drought.

The questions are whether, how, and when the state should use its authority to ease the effects of drought. This section of the state water plan proposes an answer to these questions. A policy is proposed that defines the proper role of the state in drought management. Then, this plan section recommends specific actions to fulfill that role.

BACKGROUND

Drought threatens all water needs. Dryland agriculture is particularly vulnerable. Drought also increases the threat of wildfire. These drought-related impacts arise primarily from soil moisture deficiencies. However, the most controversial drought issues typically surround the use of water from our streams, lakes, and aquifers.

The prior appropriation doctrine determines who gets to use scarce water from these sources. This doctrine of "first in time is first in right," which will continue to be the basis for water allocation and use in the state, assigns priority to water uses based solely on the date of appropriations. Given the unadjudicated status of most water rights in Montana, drought presents several problems for Montana water users. These problems include: (1) procedural difficulties in enforcing unadjudicated water rights; (2) the expense of beginning to enforce water rights in areas that historically lacked enforcement; (3) a lack of water conservation incentives in the law; and (4) legal restrictions and practical difficulties associated with changes in the use of water rights.

Under these circumstances, how can important water uses be protected? In extreme, life-threatening emergencies, the government has the authority to take water rights, with pay, to protect the public good. Such a situation is better avoided. Less intrusive ways to cope with the effects of drought, or possibly to prevent them, are preferred.

Another approach is to better inform water users about the probability of drought. Where drought appears likely,

water users may be asked to consider options that would minimize their risk and extend limited water supplies. This approach requires planning. Planning may also reduce the vulnerability of agriculture and forests to drought. Because drought occurs with greater warning and frequency than other kinds of disasters, planning has great promise for reducing its effects.

Much was learned in recent years about the types of impacts and conflicts that are likely during drought. Perhaps the most important lesson is that the best time to reduce the impacts of drought is before they happen. Recent experience has shown the need for a larger box of tools to prevent and mitigate drought-related problems.

POLICY STATEMENT

It is the policy of the State of Montana to support proactive drought management at the local level to protect the natural resources, economic base, and lifestyles of Montana citizens. This policy requires programs for drought monitoring, assessment, preparedness, mitigation, and assistance.

The state must consider the needs of all water users during drought, including dryland and irrigated agriculture; municipal and rural water suppliers; energy producers; mining and mineral processing, forest products, tourism, recreationists, and recreation-based businesses; and individual water users. Incentives should be provided for all water users to act to prevent or reduce the effects of drought. State technical and financial assistance should be provided to water users in a consistent and predictable manner. Water users should consider the risks posed by drought when making major management decisions and should know what to expect from government if drought occurs.

ISSUES, OPTIONS, AND RECOMMENDATIONS

Eight functions are identified as necessary for accomplishing the state's proactive drought management policy. The issues are how to accomplish these eight functions.

Issue 1 - Drought Monitoring and Early Warning

Drought monitoring means collecting data, analyzing it, and reporting on the probability and severity of drought. Several government agencies and a few private entities are involved. Current monitoring efforts can be improved to provide better early warning of drought conditions.

One useful tool for monitoring drought is the Palmer Drought Index (PDI). The PDI is valuable as a measure of soil moisture and its availability to meet the needs of dryland crops and rangeland forage. The PDI is calculated weekly by the National Weather Service for seven broad regions of Montana. These regions are so large that some locally severe drought conditions go unreported. Also, the PDI is not a good predictor of streamflows, particularly in mountainous regions where runoff depends primarily on snowmelt. An alternative index, known as the Surface Water Supply Index (SWSI), is being developed to forecast streamflow conditions in such areas. In Montana, both the PDI and SWSI may be used for drought early warning and monitoring. The SWSI is applicable to water users dependent on streamflows, and the PDI is applicable to dryland agriculture.

Questions arise as to how monitoring information should be compiled and made accessible. Who should be responsible? Should monitoring efforts be intensified as drought conditions appear likely?

Options

1. Improve monitoring of soil moisture.
2. Pursue the calculation of the PDI for smaller geographical areas.
3. Encourage the continued development and revision of basin-specific SWSIs.
4. Improve coordination in the collection, interpretation, and reporting of the PDI, SWSI, and other drought forecasting and monitoring information. This information must be passed on to people in time for them to make decisions to reduce their vulnerability to drought.

Recommendations

Options 2, 3, and 4 are recommended. Option 1 was considered desirable, but rejected on the basis of potential manpower and cost-related problems.

Issue 2 - Impact Assessment

Drought impacts are assessed by using the monitoring information to predict economic, environmental, and social costs. Assessments may be prepared on the drought-related impacts to: (1) specific crops and livestock, (2) tourism, (3) energy production, (4) domestic water supplies, (5) wildfire, and (6) fish and wildlife.

Options

1. Support research applicable to specific Montana locations on the relevance of water availability to

crop and livestock production, tourism, energy production, the quality of domestic water supplies, wildfire potential, and fish and wildlife production.

2. Develop economic models that can compare the value of water for various uses in the economics of specific areas in Montana.
3. Coordinate the efficient and timely assessment of impacts related to various water uses. A list of the individuals with the expertise to assess impacts should be maintained.

Recommendation

Option 3 is recommended. While basic research is strongly supported, Option 1 was rejected as being too vague to be implemented. The economic information derived under Option 2 would also be useful, but this option was rejected to avoid creating the false impression that the state is interested in reallocating water based on economic values.

Issue 3 - Coordination of Governmental Actions

Coordination is essential to properly administer programs for drought monitoring, impact assessment, assistance, education, and mitigation. Presently, the vehicle for drought management coordination is the 1985 Montana Drought Plan. This plan designates the Disaster Advisory Council as responsible for providing coordination. However, the plan and the Disaster Advisory Council are only activated after a drought situation emerges. This is contrary to the proposed proactive drought policy. Further, the coordination provided by the plan is vague with respect to drought monitoring, management decision making, assistance, education, and mitigation. There is little knowledge of, or adherence to, the plan by most other drought-affected government agencies or the general public.

Options

1. Replace the current drought plan, by directive of the governor, with a document that incorporates the recommendations of the state water plan.
2. Expand the Disaster Advisory Council to include federal, local government, and private representation.
3. Create a permanent Drought Monitoring Committee responsible for forecasting drought conditions. This committee would advise the governor of the need to activate the Disaster Advisory Council. The Drought Monitoring Committee would have authority to:
 - a. review and report drought monitoring information.

- b. identify those areas of the state with a high probability of drought and target reporting and assistance efforts to those areas.
- c. upon request, appoint and organize local drought advisory committees for those areas. Committee membership should be comprised of state and local government officials, including conservation districts; and local water user groups, including dryland and irrigated agriculture, municipal and rural water suppliers, energy producers, mining and mineral processing, forest products, tourism, recreationists and recreation-based businesses, and individual water users.
- d. assign state agency staff to provide technical assistance to local drought advisory committees.

4. Provide specific criteria for activation of the Disaster Advisory Council, other than a governor's directive.

5. Reassign responsibility for state drought management coordination from the Disaster Advisory Council to a permanent Drought Advisory Committee. The Drought Advisory Committee would be chaired by a representative of the Governor's Office and representatives of each of the other agencies previously represented on the Disaster Advisory Council, though not necessarily the directors of those agencies. Non-voting representatives of federal and local governments and public and private interest groups should also be appointed. The Drought Advisory Committee would have authority to:

- a. review and report drought monitoring information.
- b. identify those areas of the state with a high probability of drought and target reporting and assistance efforts to those areas.
- c. upon request, appoint and organize local drought advisory committees for those areas. Committee membership should be comprised of state and local government officials, including county disaster services coordinators and conservation district supervisors; local water user groups, including dryland and irrigated agriculture, municipal and rural water suppliers, energy producers, mining and mineral processing, forest products, tourism, recreationists and recreation-based businesses, and interested citizens.
- d. request state agency staff to provide technical assistance to local drought advisory committees.

Recommendations

Options 1 and 5 are recommended.

Issue 4 - Triggering Mechanisms

The current drought plan uses the Palmer Drought Index to trigger certain drought response activities. With the development of the Surface Water Supply Index, an additional criterion becomes available that is more applicable to surface water users. These criteria may be used to gauge the propriety of certain drought management activities against the severity of the drought conditions.

Triggering mechanisms serve as guides for state action. They are not intended to replace existing procedures based on local conditions and requests. For example, the issue of when to declare a disaster, and when to declare the disaster over, can be controversial. Some recreation-based businesses may oppose the designation, while some farmers and ranchers may want it in order to take advantage of federal assistance programs. This kind of conflict is best dealt with at the local level, with the triggering mechanisms merely serving as guidelines to help in making such decisions.

Options

1. To insure that drought-response efforts correspond to the magnitude of specific drought conditions, the drought plan should recommend specific actions corresponding to numerical indicators of drought severity. Actions should be linked to numerical thresholds as drought conditions both intensify and recede.
2. Both the PDI and the SWSI should be used as triggering mechanisms. The PDI should be used to indicate drought severity to dryland agriculture, and the SWSI to forecast and measure the severity of drought for surface water users. Other drought monitoring information should also be considered. If this information indicates that the PDI or the SWSI are not accurate indicators of drought severity, actions should be taken earlier or later than the triggering mechanisms would suggest.

Recommendations

Both options are recommended.

Issue 5 - Assistance Programs

Assistance programs are programs available immediately prior to, during, and after a drought. Some of these programs are reactive, rather than preventive, in nature. Federal assistance programs are primarily geared to providing financial assistance, while state assistance programs generally provide technical assistance. The federal government administers the crop insurance program, which allows farmers to protect themselves financially against drought losses. Other federal programs are activated when a disaster is declared by the president or the chief executive officer of the responsible federal agency. Although the majority of these programs are geared to agricultural users, there are a limited number of programs for other types of assistance needs.

Options

1. Expand the types of technical and financial assistance provided to all victims of drought, filling the gaps left by federal financial assistance programs.
2. Update the list of available state and federal assistance programs in the state drought plan.
3. Provide technical and financial assistance to local drought advisory committees for promoting local drought preparedness.
4. Oppose elimination of the federal crop insurance program, and support changes in this program that will make it more efficient and attractive to producers.

Recommendations

Options 2, 3, and 4 are recommended. Option 1 was rejected as being too vague and politically impractical.

Issue 6 - Funding for Drought Management Programs

Drought monitoring, assessment, education, mitigation, and assistance all cost money. The issue is how to pay for improved state drought management. Some improvement in drought management programs may be possible by reallocating and better utilizing existing resources. Significant improvements are unlikely without additional funds.

Options

1. Reallocate and better utilize existing staff and operating budgets.
2. Apply for grant funding from the Montana Water Development Program, Renewable Resource Development Program, or other state or federal sources for a pilot drought management program.

3. Seek a direct legislative appropriation of funds.

Recommendations

Option 2 is recommended. Option 1 is recommended as a fallback position if grant funding does not materialize. Option 3 was rejected as unrealistic in light of the state's current budget problems.

Issue 7 - Research and Educational Programs

Many educational opportunities are available on how to prepare for drought through the Cooperative Extension Service, the Soil Conservation Service, the Bureau of Reclamation, local conservation districts, and other agencies. Some people may not know this information exists. A water education program called the "Montana Watercourse" is established at the Water Resources Research Center in Bozeman. This program provides information to adults and also develops a training program and curriculum for school teachers to teach Montana's children about water resources and its management.

Research is ongoing in a number of areas to find ways to reduce drought impacts, particularly those suffered by agriculture. One example is research to develop more drought resistant varieties of crops.

Options

1. Encourage the use of existing water educational programs, including those of the Extension Service, Soil Conservation Service, conservation districts, and the Montana Watercourse.
2. Support ongoing research into ways to improve drought monitoring, assessment, and mitigation.
3. Publish and distribute a comprehensive annotated directory of available educational resources about water conservation.
4. Better utilize the media and other means of communication for informing the public about drought management options and activities.

Recommendations

All of the options are recommended.

Issue 8 - Drought Mitigation Strategies

Drought mitigation strategies are potential options or improvements to ongoing water management activities that would, over the long term, reduce the adverse effects of drought.

Options

1. Amend the law to allow emergency water right transfers with expedited state review.
2. Allow utilities to invoke temporary water rate hikes to encourage emergency water conservation measures.
3. Use weather modification technology where it is feasible.
4. Increase the educational emphasis given to the watershed-related aspects of forest and range management, managing plant and tree ground-cover to minimize drought impacts.
5. Provide county governments, conservation districts, or water conservancy districts the emergency authority to implement and enforce local drought plans.
6. Inventory and review operating plans of all existing reservoirs in water-short basins to encourage reservoir operators to adequately consider drought contingencies.
7. Inventory and review the operating plans of state-funded reservoirs to insure that these plans address drought contingencies. Where no operating plans exist for these reservoirs, such plans should be developed and implemented. Also, these reservoirs should be rehabilitated to operate at design capacity and improve the state's capabilities to respond to drought consistent with State Water Plan recommendations for the rehabilitation of water storage projects.
8. Establish stronger economic and other incentives for private investments in water conservation.
9. Consider feasible water storage where it will increase water supply security.
10. Consider basin closure by petition of local water users, as provided by law, to preclude over-appropriation and further aggravation of water shortage situations.
11. Encourage voluntary water conservation by domestic, municipal, and industrial water users.
12. Clarify state law so that water right holders who conserve water are clearly allowed to sell or lease the salvaged water in a manner that does not adversely affect existing water users.
13. Improve water use and conveyance efficiencies in agricultural, municipal, and industrial systems where such improvements will not adversely affect groundwater supplies or return flows needed by other water users.
14. Clarify state law to clearly allow the voluntary, temporary changes of private water rights and contract water exchanges. Such changes could reallocate water to highly valued offstream and instream water uses, whose users anticipate water short years. Such reallocations would be regulated by the state to insure the protection of other potentially affected water users and would have to be planned well in advance of the anticipated dry years.
15. Urge the Board of Natural Resources and Conservation to adopt rules where the installation of water measuring devices will significantly help to resolve conflict and improve the distribution of water during drought in water-short drainages.
16. Find ways to expedite the resolution of local water use conflicts and water rights enforcement during drought before the general adjudication process is completed.
17. Develop a model water conservation ordinance or contract clause for adoption by municipalities and rural domestic water suppliers.

Recommendations

Options 4 and 6 through 17 are recommended. Option 1 was rejected because the committee felt there was no way to expedite the water right change process without compromising the protection of other water right holders. Options 2 and 5 were rejected because these authorities already exist. Options 3 was not believed to be a viable drought management tool at this time.

PLAN IMPLEMENTATION

Legislative Action

First, the legislature needs to clarify the planning and coordination responsibility for drought response. The Division of Disaster and Emergency Services should continue to be responsible for disaster declaration and emergency response activities, while the Drought Advisory Committee would assume responsibility for planning and coordinating drought preparation activities. Second, the legislature needs to clarify that the water rights change statute allows voluntary, temporary water right changes that would not adversely affect other water users. Third, the legislature needs to clarify that water right holders who salvage water through conservation retain the right to sell or lease that water.

Administrative Action

Calculating the Palmer Drought Index for smaller geographical areas should be the responsibility of the State Climate Center at Montana State University. The Soil Conservation Service should continue to develop and refine the Surface Water Supply Index. Coordination in reporting drought monitoring information should be the responsibility of the Department of Natural Resources and Conservation (DNRC), in cooperation with the Montana Water Information System in the State Library. The DNRC would report drought information using computer generated maps prepared by the Montana Water Information System. The reporting effort should make better use of the media and other available means of communication, such as computer bulletin boards.

Once authorized by the governor and the legislature, the Drought Advisory Committee should oversee the development of a new Montana Drought Plan. The new Montana Drought Plan should list individuals with the technical expertise and responsibility to perform drought impact assessments, upon request of the Drought Advisory Committee. This plan should also provide an updated list of state and federal assistance programs and identify the specific triggering mechanisms used to guide drought management actions.

Once a high probability of drought is indicated, the Drought Advisory Committee should consult with the local officials in the drought prone area and offer to provide state assistance to a local drought advisory committee. Local drought advisory committees also may be created in normal years where sufficient interest exists. The DNRC would staff the state Drought Advisory Committee and provide technical assistance to local drought advisory committees. The state Drought Advisory Committee is not intended to have any authority over the local committees. This relationship is necessary merely to ensure coordination between the state and local levels. Existing organizational relationships between state government and local officials (such as the relationship between the DNRC and local conservation districts) should be used to the extent possible to ensure efficient coordination. Local entities, such as conservation districts, should be encouraged to apply for state financial and technical assistance to develop local drought plans at any time.

The publication of an annotated directory of available educational resources about water conservation should be the responsibility of the Montana Watercourse. This program should also promote voluntary water conservation as part of its general educational charge and encourage the use of water education resources in the state.

The Board of Natural Resources and Conservation is urged to adopt rules relating to water measuring devices, as necessary to resolve conflict and improve distribution of water during drought. The way in which water storage will be considered for improving water supply security should be determined in the State Water Plan. The cooperation and assistance of the state Water Court and local district courts should be sought to find ways to expedite the resolution of local water right conflicts during drought.

The responsibility falls to the Drought Advisory Committee, with DNRC staff, to implement all of the other recommendations in this plan section, although other entities will certainly play an important part. These recommendations include suggesting basin closure as an option for local water users, seeking more efficient water use and conveyance by large water users, inventorying and reviewing reservoir operating plans, opposing elimination of the Federal Crop Insurance Program, educating people about management options to reduce drought impacts, and developing a model water conservation ordinance for adoption by municipalities and rural domestic water suppliers.

Financial Requirements and Funding Strategies

A grant is requested from the Water Development Program to establish a pilot drought management program. This grant will be a cooperative endeavor involving the State Climate Office, the State Library, the U.S. Soil Conservation Service, and the DNRC. The grant would provide staff and an operational budget to initiate implementation of the recommendations of this plan section.

A priority use of the grant would be to test the proactive, locally-focused drought management approach if a drought arises during the time when grant resources are available. If no drought develops, the funds will be used to lay the foundation for the use of this management approach when the occasion arises. This foundation includes the production of the new Montana Drought Plan, the establishment of the improved monitoring and early warning system, and the development of educational efforts and various mitigation strategies.

The reallocation of DNRC staff resources and operating expenses is recommended as a fallback method of funding some of the recommendations in this plan section if grant funds are not awarded. The efficient use of existing financial resources, and any available grant funding, is essential to implement this plan section.

BIBLIOGRAPHY

Drought Management Steering Committee. February 26, 1990. *Background Report*. Helena, MT.

Ferguson, Hayden. January 4, 1990. "An Approach to the Assessment of Crop Loss Due to Drought." Memorandum prepared for the Drought Management Steering Committee meeting, State Water Plan. Bozeman, MT.

Jackson, David. January 4, 1990. "Drought Planning and Economic Effects of Drought." Memorandum prepared for the Drought Management Steering Committee meeting, State Water Plan. Missoula, MT.

Martin, Curt. November 9, 1989. "Drought Plans of Other States." Paper prepared for the Drought Management Steering Committee, State Water Plan. Helena, MT.

Montana Department of Natural Resources and Conservation. December 26, 1989. "Drought Monitoring Appendix," *Drought Management Subsection, State Water Plan*. Prepared for the Drought Management Steering Committee, State Water Plan. Helena, MT.

Montana Disaster and Emergency Services Division. September 30, 1985. *Montana Drought Plan*. Helena, MT.

Wilhite, Donald A. June 5, 1989. *Planning for Drought: A Process for State Government*. Draft Report Supported by the Climate Dynamics Program, National Science Foundation. Lincoln, Nebraska: University of Nebraska.

Plan Implementation Summary

<u>Action</u>	<u>Responsibility</u>	<u>Deadline</u>
Issue 1-Drought Monitoring Calculate PDI for smaller regions Develop SWSI Improve monitoring coordination	State Climate Center Soil Conservation Service (SCS) DNRC, State Library	January, 1992 January, 1992 January, 1992
Issue 2-Impact Assessment Coordinate timely impact assessments	Drought Advisory Committee	As Needed
Issue 3-Coordination of Government Actions Replace State Drought Plan Define drought management responsibility of Drought Advisory Committee	Governor, Drought Advisory Committee Legislature	August, 1991 April, 1991
Issue 4-Triggering Mechanisms Include triggering mechanisms in new drought plan	Drought Advisory Committee	August, 1991
Issue 5-Assistance Programs Update list of assistance programs Assist local drought advisory committees	Drought Advisory Committee All State and Federal Agencies	August, 1991 As Needed
Issue 6-Funding Drought Management Programs Obtain grant funding	Legislature	July, 1991
Issue 7-Research and Education Programs Encourage the use of existing programs Support ongoing research Publish directory of water conservation information Develop public information strategy	Montana Watercourse, SCS, Extension Service, Conservation Districts, DNRC Montana University System Montana Watercourse Drought Advisory Committee	Ongoing Ongoing January, 1992 August, 1991
Issue 8-Drought Mitigation Strategies Inventory reservoir operating plans Consider water storage and basin closure Encourage water conservation Clarify that state law allows sale or lease of salvaged water Clarify that state law allows voluntary, temporary water right transfers Consider adoption of water measurement rules Expedite water rights conflict resolution and enforcement Develop a model water conservation ordinance Educate about forest and range management options to reduce drought impacts	Drought Advisory Committee, DNRC Drought Advisory Committee, DNRC Drought Advisory Committee, DNRC Legislature Legislature Board of Natural Resources and Conservation Water and district courts, Drought Advisory Committee, DNRC Drought Advisory Committee, DNRC Drought Advisory Committee, DNRC	July, 1992 Ongoing Ongoing April, 1991 April, 1991 October, 1992 Ongoing August, 1991 Ongoing